1-30-1998

# UM neuroscientist finds clue to CNS regeneration

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NEWS RELEASE

Jan. 30, 1998

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**UM NEUROSCIENTIST FINDS CLUE TO CNS REGENERATION**

**MISSOULA--**

A neuroscientist at The University of Montana-Missoula has discovered that a well-known enzyme could be an important link in improving recovery of the central nervous system after injury.

Diana Lurie, a UM assistant professor of pharmaceutical sciences, has found that SHP-1, an enzyme thought to play a role in regulating cell division, is present in large amounts in certain brain cells after injury. Lurie wants to know whether SHP-1 helps or hinders CNS regeneration.

"Neurons -- the nerve cells in the brain or spinal cord -- will regenerate a little bit," Lurie said, "but when they reach the area of the lesion, the scar, they generally stop growing. And it's not the scar that makes a physical barrier; it's something about the chemical composition of the scar that prevents regeneration."

Lurie said that if one were to take those neurons and let them grow in the peripheral nervous system, they would grow for much longer distances. It's the environment in the CNS that prevents their regeneration, she said. Lurie studies the cells that make up that environment.

"Those cells are called glial cells," she said. "Neurons are surrounded by glial cells. We don't understand very much about either the good things or the bad things glial cells do

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following injury."

But scientists know that some glial cells -- astrocytes -- divide after injury, Lurie said, and the increase in cells is part of what forms the scar. But not all astrocytes divide. If they did, Lurie said, scars would be huge and tumor-like after injury.

What Lurie has found is a group of astrocytes in the brain that contain SHP-1 after injury. Normally the brain has low levels of the enzyme, she said.

"In a group of cells that normally don't have a lot of this enzyme, suddenly they have a lot, and you can see it after injury," she said. "And it looks like the cells that don't divide have SHP-1 in them. So perhaps SHP-1 is made by the cells to prevent them from dividing." The question for Lurie is whether these cells that don't divide release chemicals into the environment that help neurons to grow, or whether these cells inhibit regeneration.

Lurie said researchers have recently identified chemicals some astrocytes produce that may be good for regeneration, but their studies haven't located which astrocytes are producing the chemicals. Lurie's discovery of a group of astrocytes that produce SHP-1 advances that research.

"We now have a marker for another subset of astrocytes that seem to be doing something a little bit different besides dividing after injury," she said. "My lab is trying to figure out what they are doing. If we could genetically put SHP-1 into all the glial cells in the brain, would the brain recover well after injury or not?"

Lurie does much of this research on young chickens. To stimulate changes in their brains similar to an injury, she removes the cochlea -- the organ in the inner ear that translates sound waves into electrical signals that convey information to the brain. Removing the cochlea stops the electrical signals, which then causes changes to that area of the brain where the

information first enters: Some of the neurons die, and some of the surrounding astrocytes start to divide. Those containing SHP-1 don't divide.

"It seems to be a general feature of nervous system injury, so I think we're talking about a very basic mechanism here in terms of the regulation of what happens in the brain after injuries," Lurie said.

Historically in this field of research, Lurie said, a scientist would injure, for example, a rat spinal cord and then "throw all kinds of different substances in to see if they would help regeneration." Nothing really helped much, she said, so researchers decided it was time to step back and look at basic mechanisms of what happens after injury and use that information to design a therapy.

"Ultimately the goal of any biomedical research is to develop a therapy," Lurie said. "For me that therapy would be to improve or even get some significant functional central nervous system recovery after injury."

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